

Claims

1. Means for cooling the leading edge of an airfoil of a turbine blade comprising a mid-chord passage formed in said airfoil flowing a coolant, a wall defining the leading edge of the airfoil, a plurality of rows and columns of longitudinal extending grooves formed in the outer surface of said wall at the leading edge of said airfoil, each of said grooves fluidly connected to said mid-chord passage for receiving coolant, a plurality of longitudinal spaced orifices formed in said wall connecting said mid-chord passage to a longitudinal plenum formed in said wall, an additional plurality of longitudinal spaced orifices formed in said wall downstream of said plurality of orifices connecting said plenum to said each of said grooves wherein said coolant from said mid-chord passage is diffused before exiting from said airfoil.

2. Means for cooling the leading edge of an airfoil of a turbine blade as claimed in claim 1 wherein each of said plurality of rows are staggered relative to an adjacent row.

3. Means for cooling the leading edge of an airfoil of a turbine blade as claimed in claim 1 wherein each of said plurality of rows are aligned relative to an adjacent row.

4. Means for cooling the leading edge of an airfoil of a turbine blade as claimed in claim 1 wherein each of said plurality of columns are staggered

relative to an adjacent row.

5. Means for cooling the leading edge of an airfoil of a turbine blade as claimed in claim 1 wherein each of said plurality of columns are aligned relative to an adjacent row.

5 6. Means for cooling the leading edge of an airfoil of a turbine blade as claimed in claim 1 wherein the grooves and orifices are sized to control the amount of airflow in each of the grooves so that the airflow spanning the area of the leading edge in a chord-wise direction is relatively constant.

10 7. Means for cooling the leading edge of an airfoil of a turbine blade as claimed in claim 1 wherein the length of each of said grooves complement the length of each of said plenums.

8. Means for cooling the leading edge of an airfoil of a turbine blade as claimed in claim 1 wherein said rows and said columns of grooves extend from the pressure side to the suction side.

15 9. A turbine blade having an airfoil, a platform and an attachment comprising a coolant passage formed internally in said blade being fed coolant from the attachment through the platform and into said airfoil, said coolant passage extending longitudinally in said airfoil, a wall defining the leading edge of said airfoil, a plurality of rows and columns of longitudinal extending

grooves formed in the outer surface of said wall at the leading edge of said airfoil, each of said grooves fluidly connected to said coolant passage for receiving coolant, a plurality of longitudinal spaced orifices formed in said wall connecting said coolant passage to a longitudinal plenum formed in said wall, an additional plurality of longitudinal spaced orifices formed in said wall downstream of said plurality of orifices connecting said plenum to said each of said grooves wherein said coolant from said coolant passage is diffused before exiting from said wall of said airfoil.

10. A turbine blade as claimed in claim 9 wherein each of said plurality of rows are staggered relative to an adjacent row.

11. A turbine blade as claimed in claim 9 wherein each of said plurality of rows are aligned relative to an adjacent row.

12. A turbine blade as claimed in claim 9 wherein each of said plurality of columns are staggered relative to an adjacent row.

13. A turbine blade as claimed in claim 9 wherein each of said plurality of columns are aligned relative to an adjacent row.

14. A turbine blade as claimed in claim 9 wherein the grooves and orifices are sized to control the amount of airflow in each of the grooves so that the airflow spanning the area of the leading edge in a chord-wise direction

is relatively constant.

15. A turbine blade as claimed in claim 9 wherein the length of each of said grooves complement the length of each of said plenums.

5 16. A turbine blade as claimed in claim 9 wherein said rows and said columns of grooves extend from the pressure side to the suction side.